



LAI Today and Tomorrow

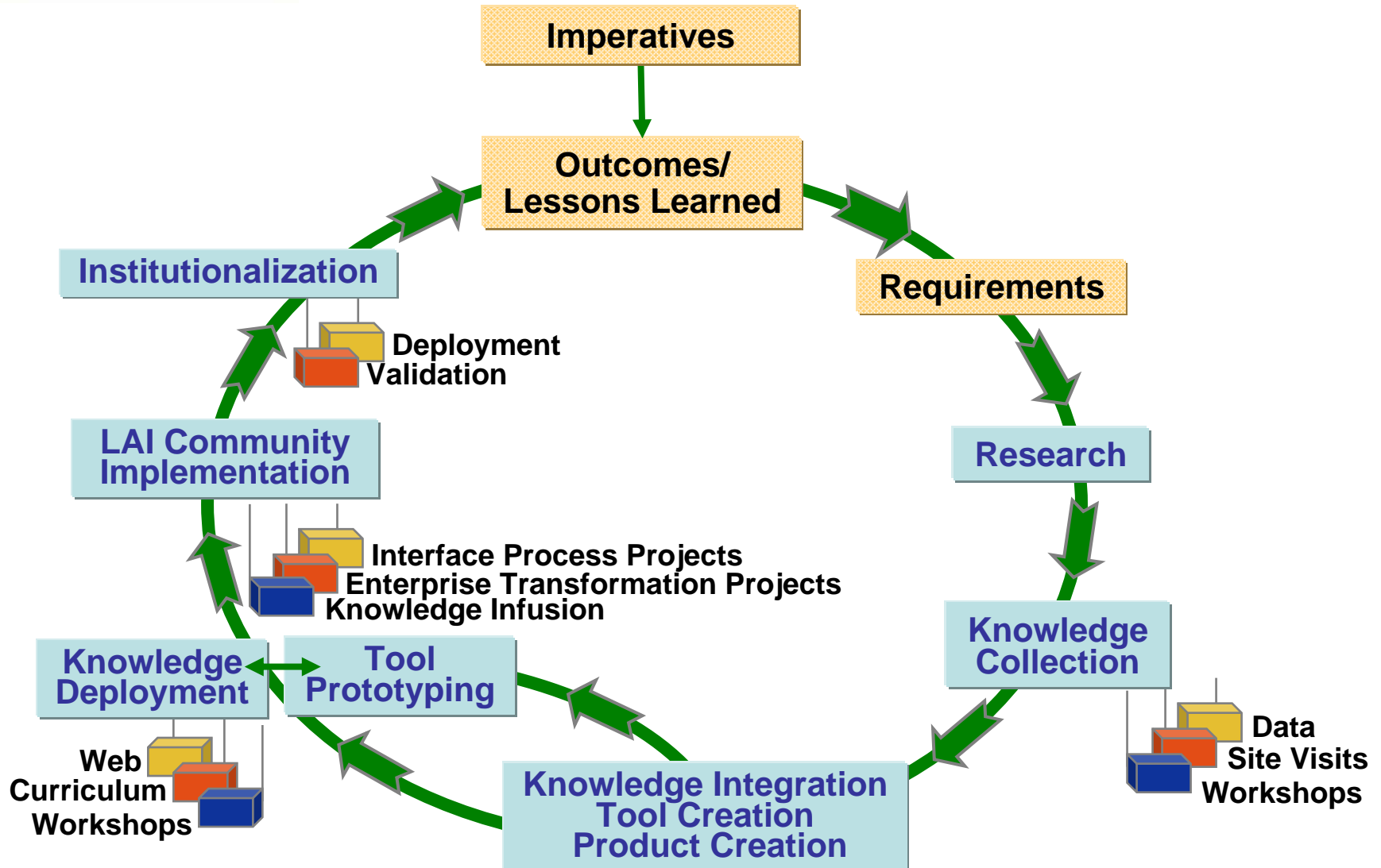
Presented by
Professor Debbie Nightingale
LAI Plenary Conference
March 22, 2005

- **Highlights Since Last Plenary**
- **Future Direction for Phase V**
- **Conference Highlights**

Highlights Since Last Plenary

- **Highlights Since Last Plenary**
 - Systems Engineering
 - Research and Products
 - EdNet
 - Lean Training
 - Lean Now
- **Future Direction for Phase V**
- **Conference Highlights**

LAI Knowledge Cycle

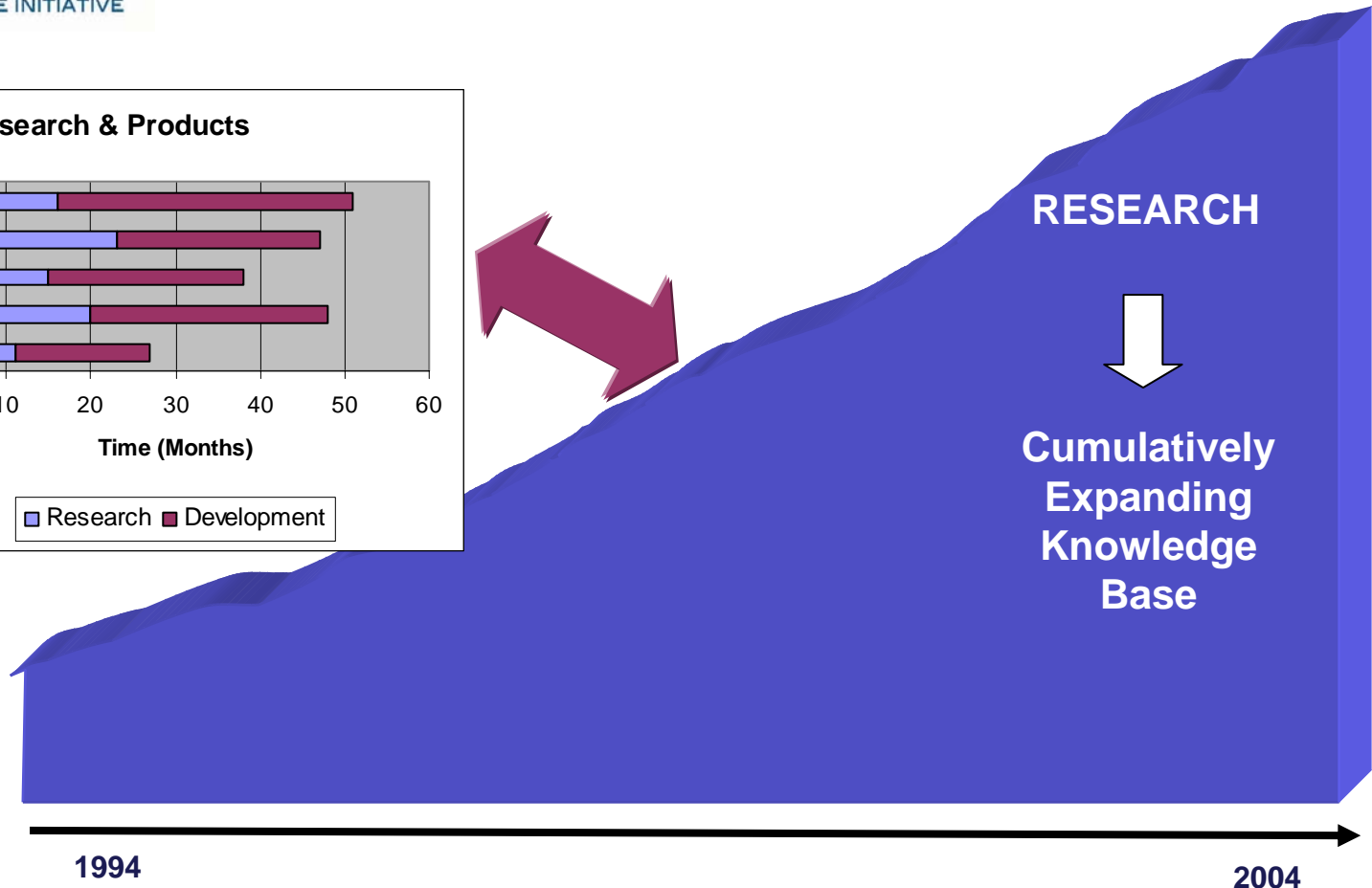
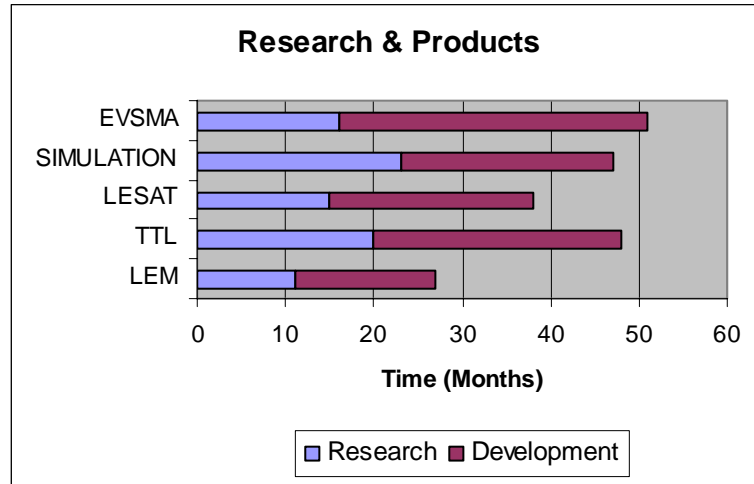


Systems Engineering

Systems Engineering became a significant focus area in 2004 in response to Air Force and DoD SE Revitalization policies and initiatives

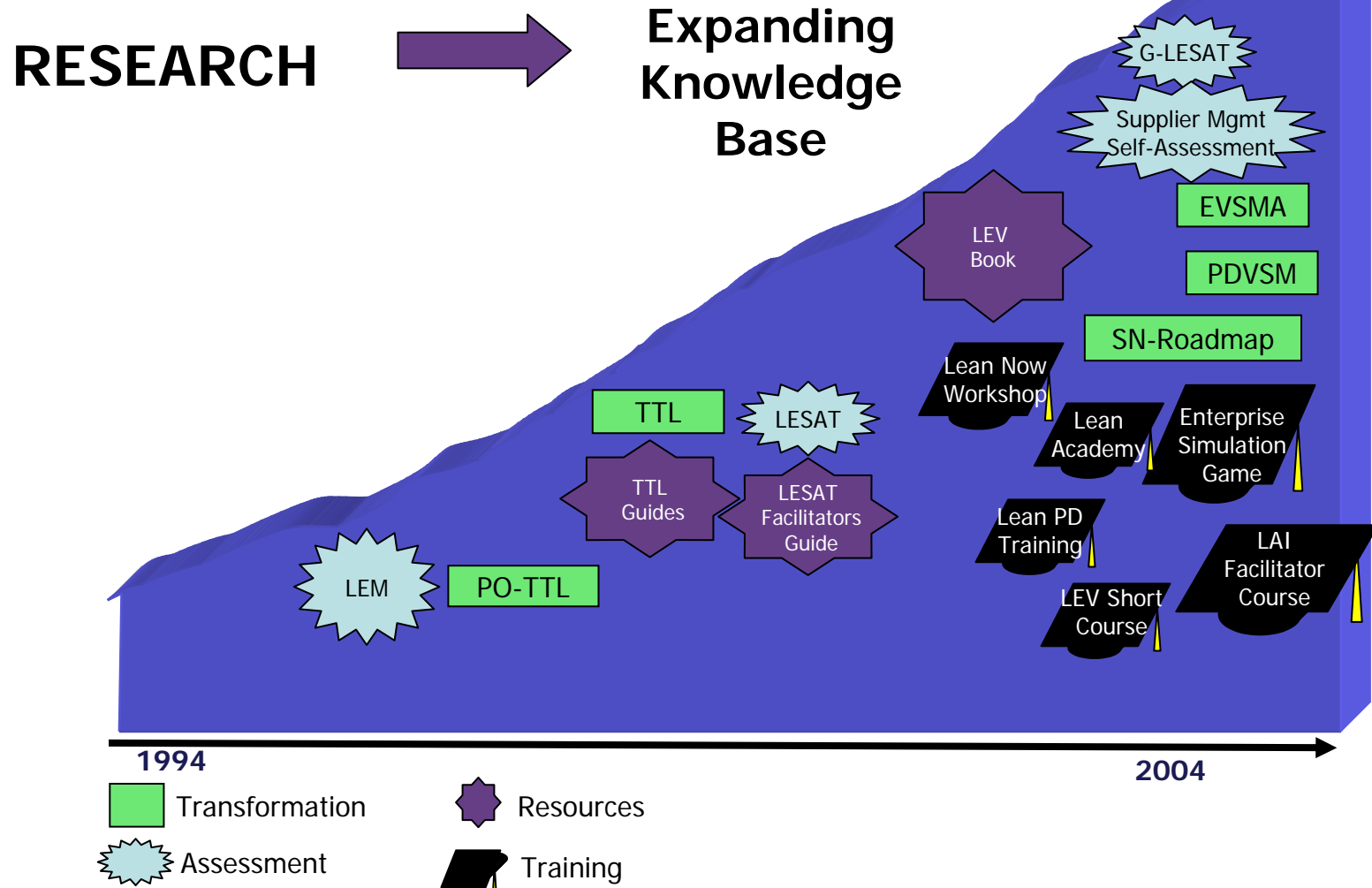
- **AF/LAI Workshop on Systems Engineering for Robustness held in June 2004 helped shape several initiatives**
 - Value of SE Technical Report published
 - SE Leading Indicators Working Group formed and ongoing
- **SE Research Group formed at MIT**
 - Seven students (and growing) working on advanced systems architecting and engineering topics
- **Continued meetings of the EdNet Lean SE group**
- **LAI research papers at six conferences and Lean SE panel session at INCOSE 2004 Symposium**
- **Strategy and plan developed for new LAI product to support systems engineering community, to supplement CMMI and LESAT**
- **Collaborations developed with AF Center for Systems Engineering, FFRDCs, Consortia, and Industry Associations**

Coevolving Research and Tools



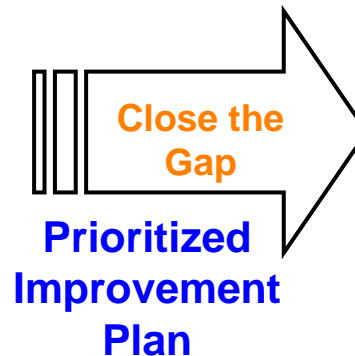
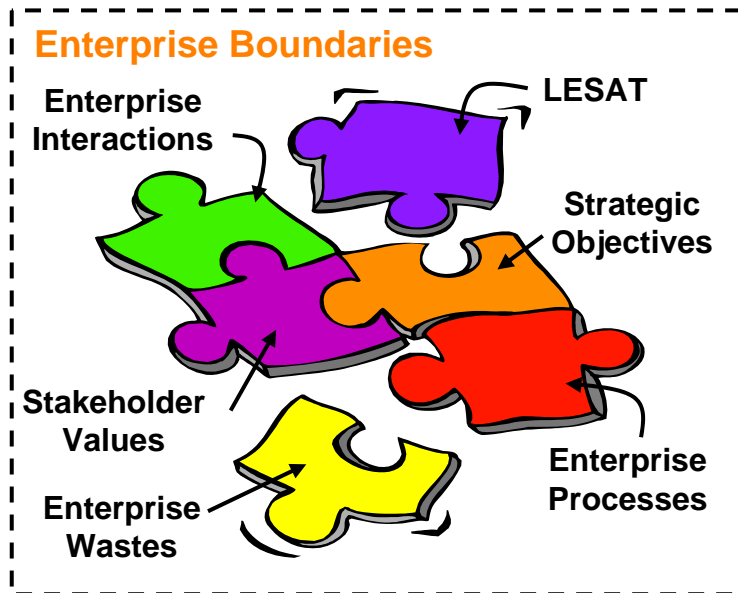
- Tools/Products are responsive to emerging stakeholder needs
- Research precedes the development of tools
- Tool development draws upon the cumulative knowledge base

Coevolving Research and Tools

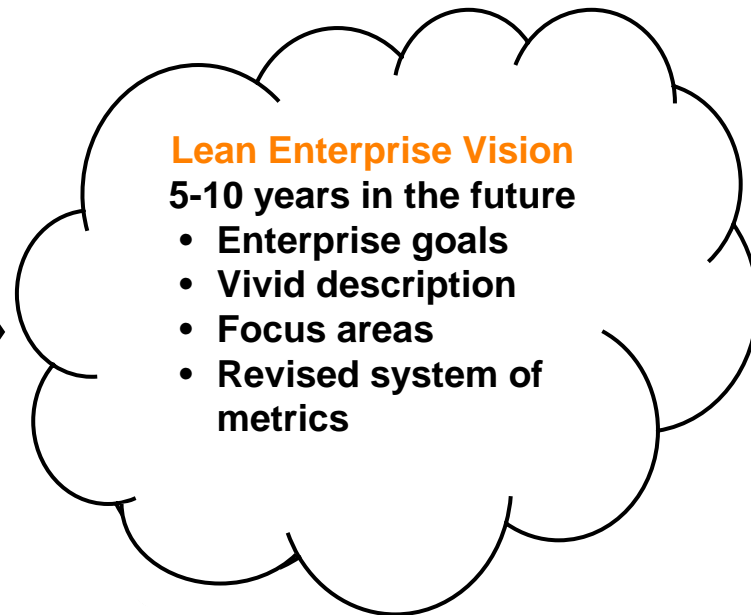


Enterprise Value Stream Mapping and Analysis (EVSMA) Approach

**Define and Characterize
the
Current State**



**Create
the
Future State**



- Creates common enterprise view among executive team
- Develops a strategic vision for the enterprise
- Provides foundation for transformation with executive buy-in

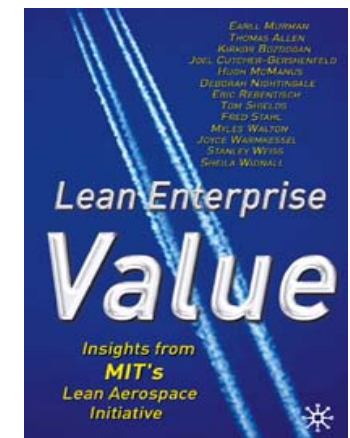
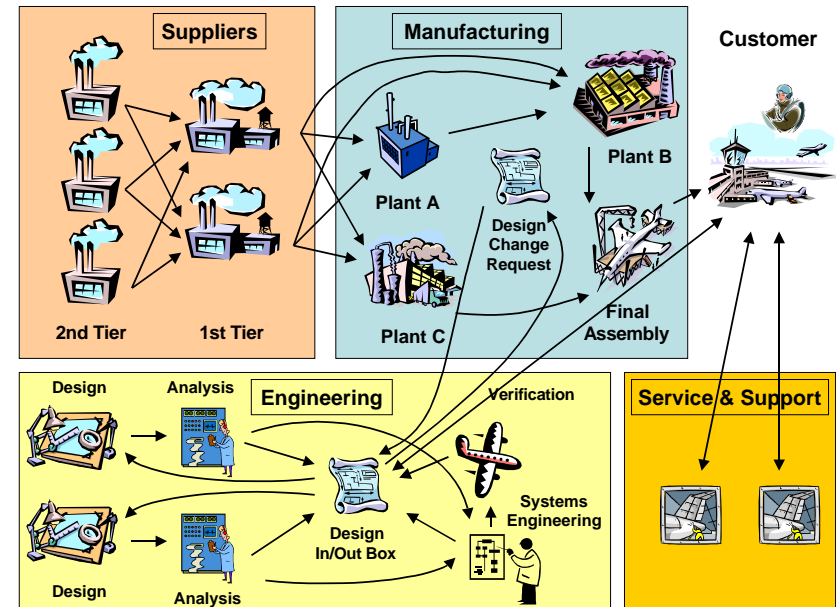
EVSMA Product Development and Testing Highlights

- **Ogden ALC**
 - Identified need for systematic change capability development to implement and sustain improvements
- **C-17**
 - Redefined enterprise boundaries to include Boeing, SPO, and DCMA working collaboratively towards improvement
- **Tinker ALC**
 - Utilized refined EVSMA process and incorporated lessons learned for developing lean change experts

Lean Change Infrastructure Key to Success

Lean Enterprise Value Business Simulation

- **A Training and Facilitation tool for Enterprise Transformation**
 - Teaches the application of lean tools through active participatory learning
 - Develops enterprise thinking and analysis skills and experience the benefits of the lean enterprise
 - Accelerates transition to productive work in lean interventions (e.g., value stream mapping events)
 - Builds stronger relationships in the value stream with customers, partners, and suppliers
- **A Simulation of a Complex Aerospace Enterprise**
 - Manufacturing, Engineering, Supply Network and Service and Support Modules
 - Modular and adaptable for a variety of learning objectives and events

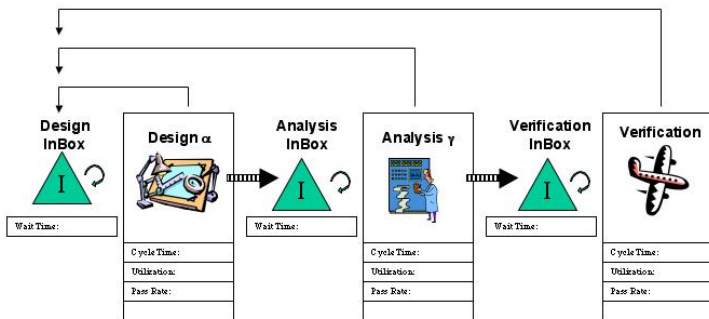


A Simulation Environment for Multiple Lean Concepts

- **Applications:**

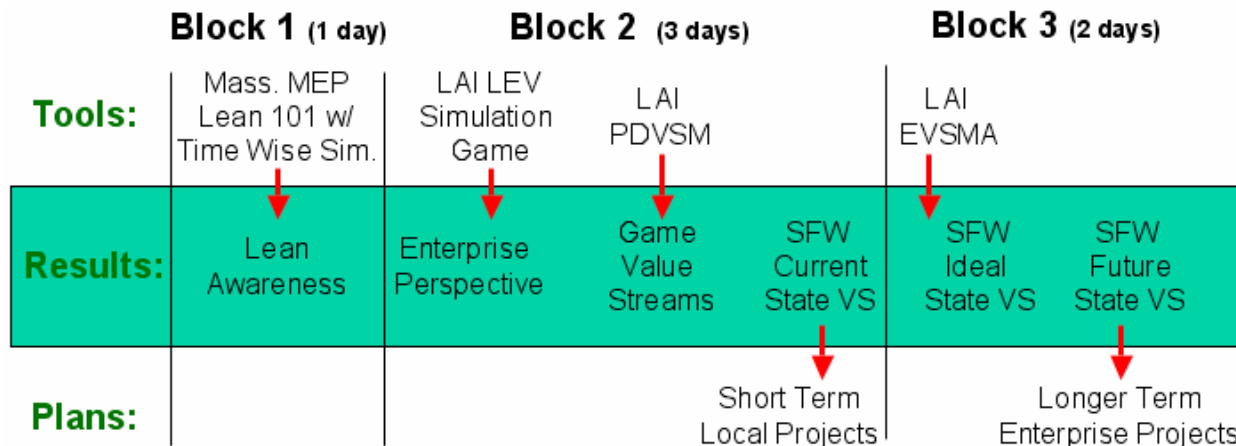
- Lean enterprise training for:
 - OEM production
 - Service and support operations
 - Depot refit/modification operations
 - Six Sigma expert analysis tools
 - Enterprise value stream mapping
- Focused training for:
 - Lean engineering
 - Lean Academies™
 - Train-the-trainer deployment.

- **Simulation environment enables hands-on instruction in advanced analysis tools**
- **Highlights principles and practices of Lean Enterprise transformation**



Using the Simulation for Program Enterprise Transformation

- **Simulation customized to resemble actual program**
 - Participants learn lean, teamwork, and VSM concepts in simulation—then apply to actual program value stream
 - Actual program VSM proceeds very rapidly with high fidelity
- **Textron SFW Event**
 - Production and supply chain challenges
- **L3 EC-130 *Compass Call* Event**
 - Depot refit/modification variant of simulation introduced
 - Refit and Engineering Integration challenges



**From event
start to high-
payoff action
plans in a few
working days!**

Product Development Value Stream Analysis and Mapping Manual (PDVSM)

Product Development Transition to Lean Roadmap (PDTTL)

Product Development
Transition to Lean
(PDTTL) Roadmap



- Practical guides to application of lean to PD
- Summary and reference for 6+ years of PD group experience
- PDTTL focused on the strategic level: transforming PD for enterprise lean success
- PDVSM focused at the tactical level: engineering process improvement
- Resources for engineering change, from program or functional transformations to local *Kaizens*
- Beta PDVSM released April 04, 1.0 in progress
- Beta PDTTL released March 05

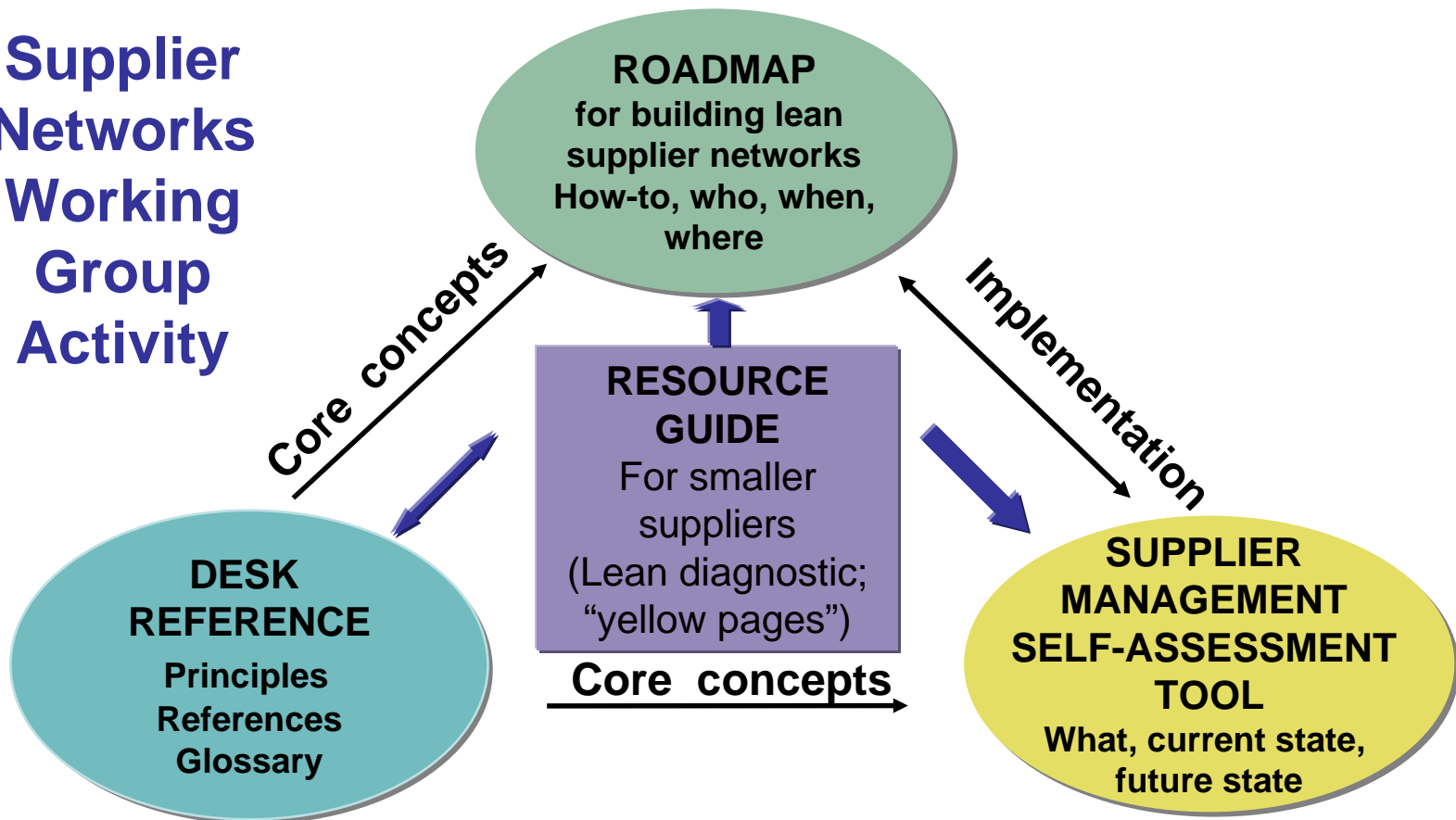
Product Development
Value Stream Mapping
(PDVSM) Manual



Hugh L. McManus, PhD

Supplier Networks Transformation Toolset can Help Accelerate Industry's Transformation

**Supplier
Networks
Working
Group
Activity**



OBJECTIVE: Develop integrated lean supplier networks transformation toolset

LAI Educational Network

Vision: Active communication and collaboration among member schools, and with LAI members, to support the transformation of the greater US aerospace enterprise

Mission: Support continuous learning throughout the US aerospace enterprise by sharing knowledge and curriculum

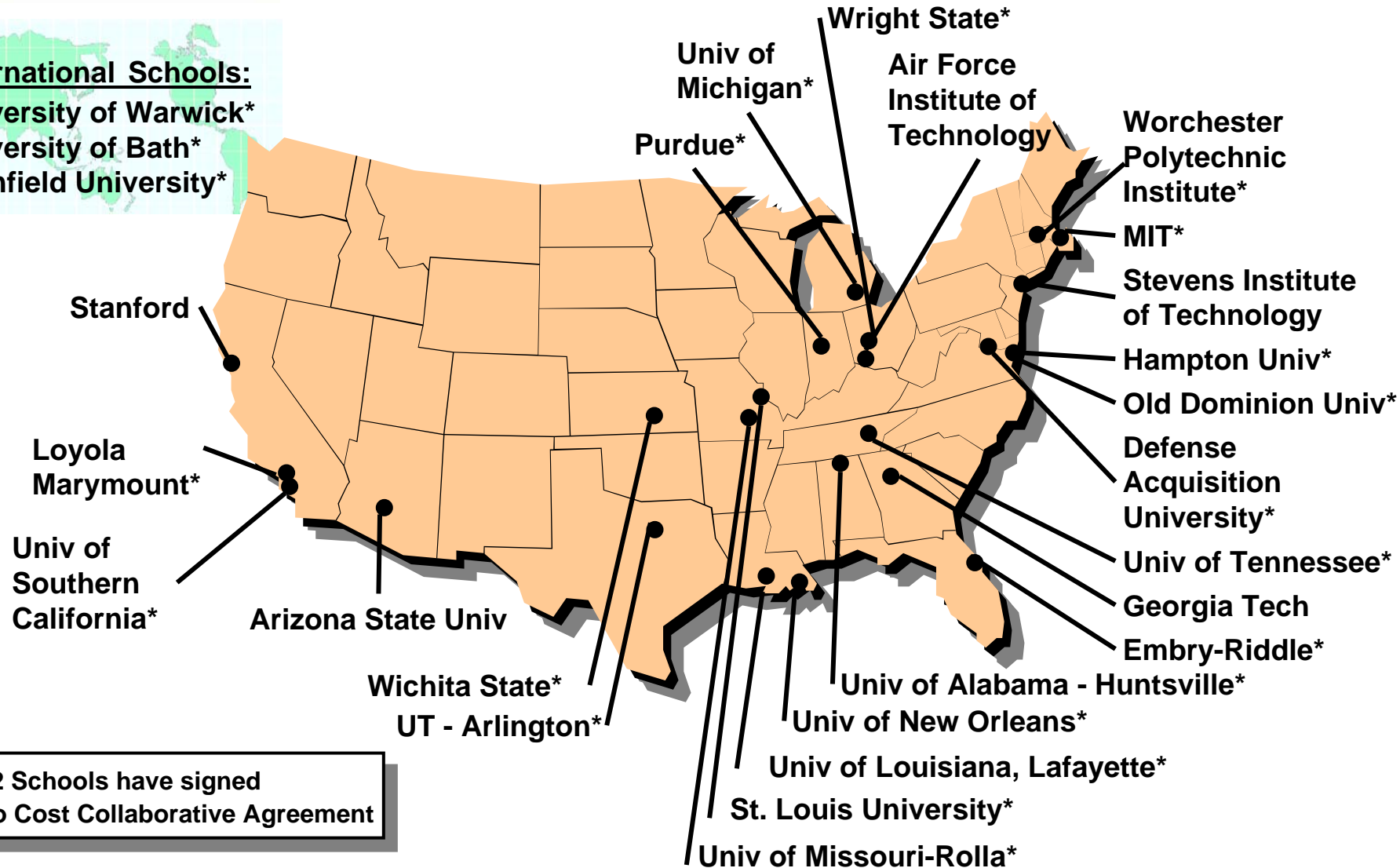


**Adding Value by Leveraging Efforts
Through Networking**

Schools Engaged as of 3/05

International Schools:

University of Warwick*
University of Bath*
Cranfield University*



* 22 Schools have signed
No Cost Collaborative Agreement

Lean Academy Strategy



“Empowering,
practical,
critical”



“I see lots of
room for
Lean in my
department.”



- Develop university faculty capability to teach lean
- Develop curriculum
- Educate undergraduate level interns, coops, new hires, on-site, at “point of use”
- Stimulate diffusion of curriculum into on-campus courses
- Build industry-academia partnerships

Short and long term value for multiple stakeholders!

- **Lean Now 1-day workshop**
 - Basic awareness training for improvement teams
 - Introduces terminology
 - Provides case study application of concepts
 - Prepares participants for productive contribution to VSM events
- **1-week Facilitator introduction**
 - Introduction to analysis and facilitation techniques
 - Provides hands-on application through simulation
 - Requires additional mentoring and experiential learning to supplement

Sharing the Best of the Best of LAI Members

Lean Now to Large Scale Transformation

Lean Now Wave 1

- ☐ Alpha Contracting – Global Hawk
- ☐ Combined Test Force – F/A-22
- ☐ Inactive Contract Closeout – F-16

Lean Now Wave 2

- ☐ Turbine Engine Test – AEDC**
 - Seek Eagle Stores Separation
- ☐ Procurement Request Process – Ogden ALC

Large Scale Enterprise Engagements

- ☐ Ogden ALC
- ☐ C-17
- ☐ Oklahoma City ALC
- ☐ Industry Engagements

- Culture Change
- Self Sufficiency
- Measurable Results
- Multiple Stakeholders
- Multiple Interfaces
- “Pull” for Lean
- High Degree of SME Knowledge Sharing

- Lean Now Wave 3
 - ✓ EC-130 Compass Call
- Enterprise Engagements

** Arnold Engineering Development Center

L-3 Com EC-130 Workshop— Lean Awareness and EC-130 Value Stream Mapping

Why: Elevate Enterprise Value Stream thinking

- Identify EC-130 projects to close the gap – Current State and Future State
- Deliver more EC-130 or equivalent resource capabilities for fixed budget

How: Use LAI tools and facilitators

- Involve Multiple Stakeholders
- Achieve Enterprise Integration

L-3 Com was the Second consortium member to use LAI's Lean Enterprise Value simulation as an enabling tool involving all stakeholders and enterprise integration for an Air Force program



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LAI Vision and Mission (Phase V)

Vision

**Enable enterprises
to effectively, efficiently, and reliably create value
in a complex and rapidly changing environment**

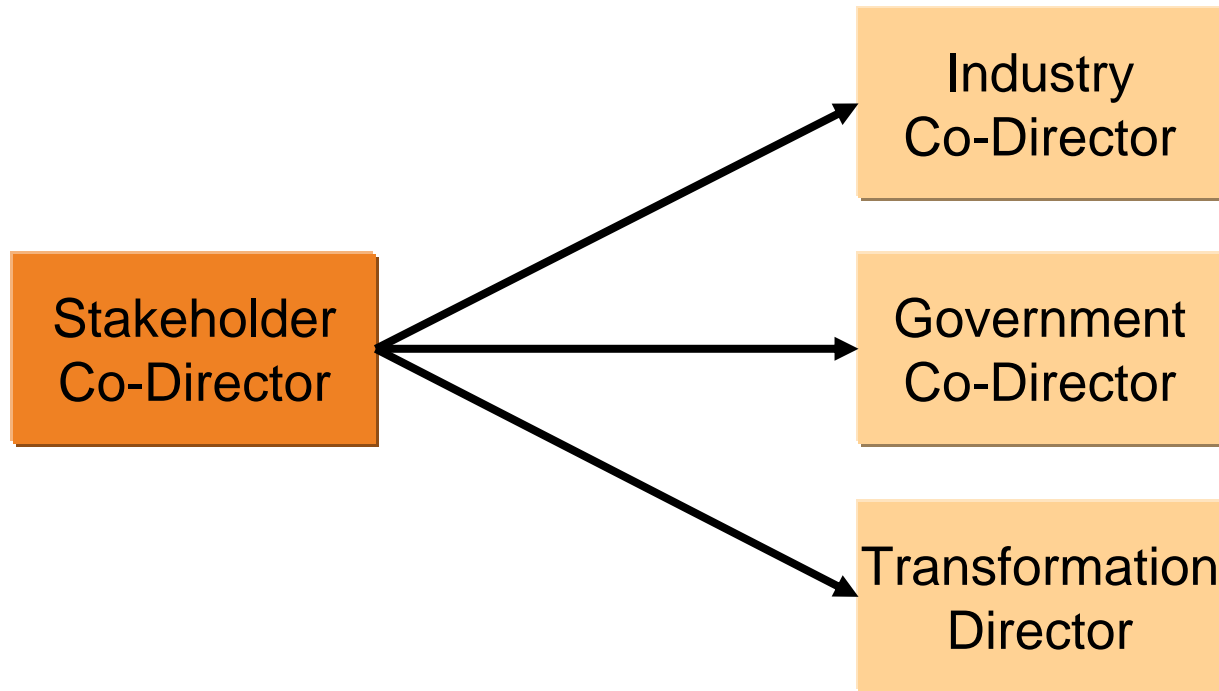
Mission

**Enable focused and accelerated transformation of
complex enterprises through the collaborative
engagement of all stakeholders to develop and
institutionalize principles, processes, behaviors,
and tools for enterprise excellence**

Imperatives

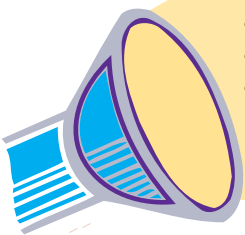
- Provide value to all consortium stakeholders
- Sustain the LAI consortium as a learning community among industry, government, the workforce, and academia to address enterprise excellence and take collective action for continuous improvement
- Facilitate enterprise transformations within and between industry and government
- Expand and diffuse enterprise transformation knowledge

Increasing Stakeholder Value



Recommended by Strategic Business Model Team

LAI - Expanding Enterprise Focus



EVOLUTION OF LEAN ENTERPRISE THINKING

Functional lean successes

- Manufacturing
- Product Dev.
- Supplier Network

**"Islands" of Success
Phase I**



Products

**Knowledge
Cycle Time**

web.mit.edu/lean

(~6 mo)

**Successes through
interaction between
functions**

**Lean applied to
enabling processes**

- HR
- IT, etc.

Phase II



(~1 yr)

**Transition from waste
Minimization to value
creation**

**Success through
enterprise integration**

Phase III

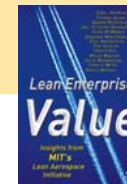


(~2 yrs)

**Success through total
enterprise integration of all
stakeholders**

- Industry
- Government
- Suppliers
- Employees

Phase IV



(~3 yrs)

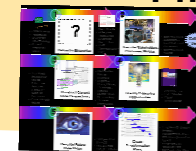
**Success through
networked enterprises**

**Expanding the
lean boundaries**

- Suppliers
- Customers
- Partners

**Increasing
Total
Enterprise
Effectiveness**

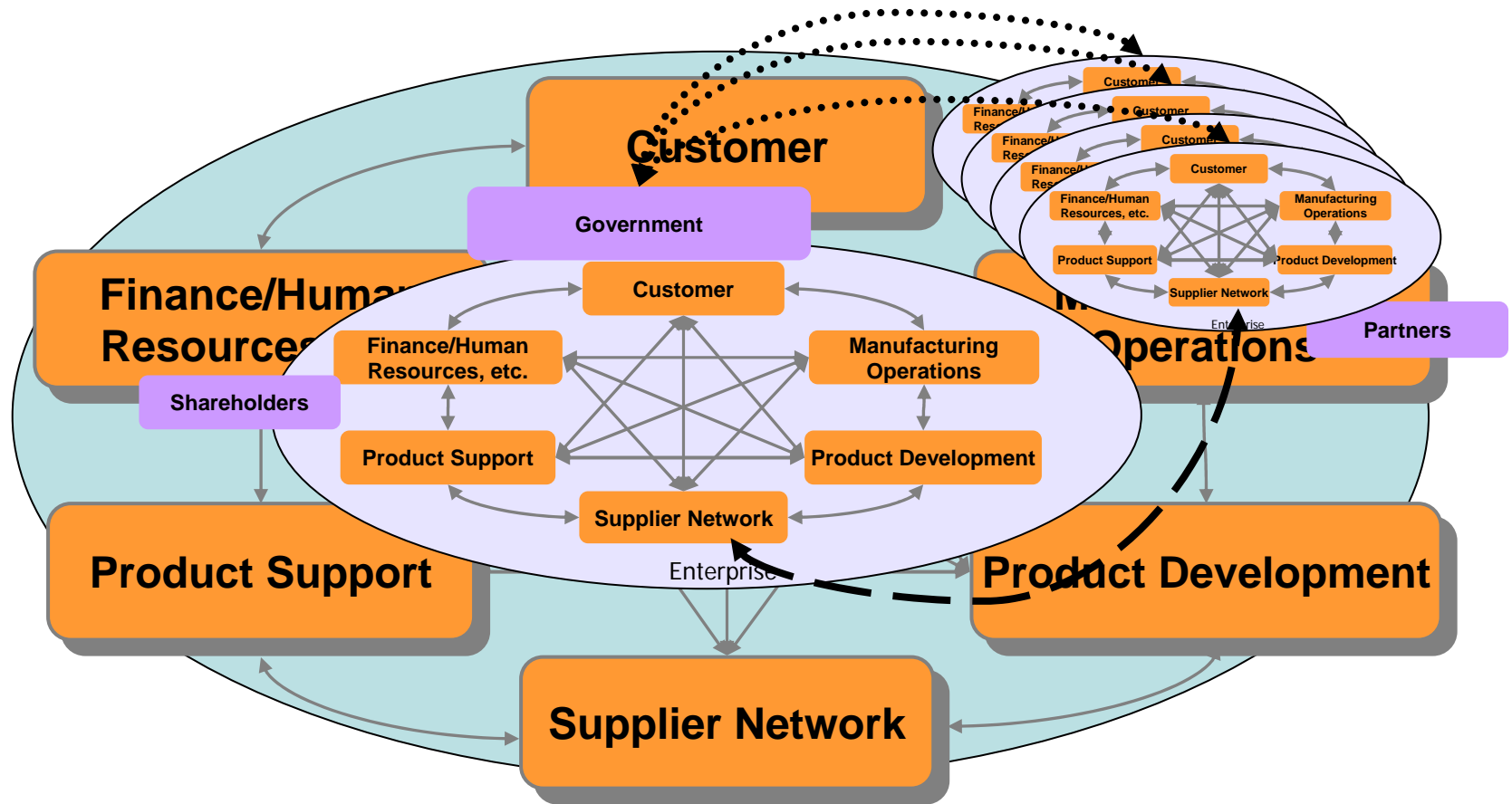
Phase V



EVSM Architecting Toolset

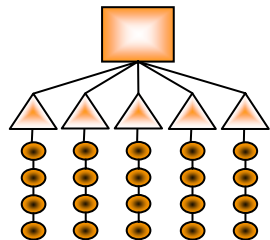
(>4 yrs)

Looking Ahead – We see Evolving Enterprise Scope

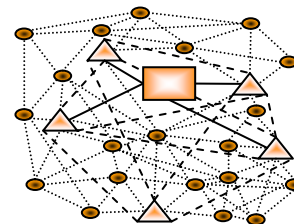


Emerging Key Challenges

- Managing increasing technological complexity
- Designing collaborative networked enterprises
- Adapting to fast-changing external environment
- Coordinating across multiple interfaces

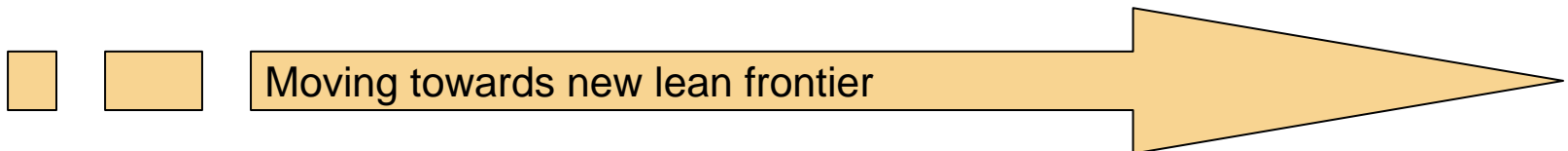
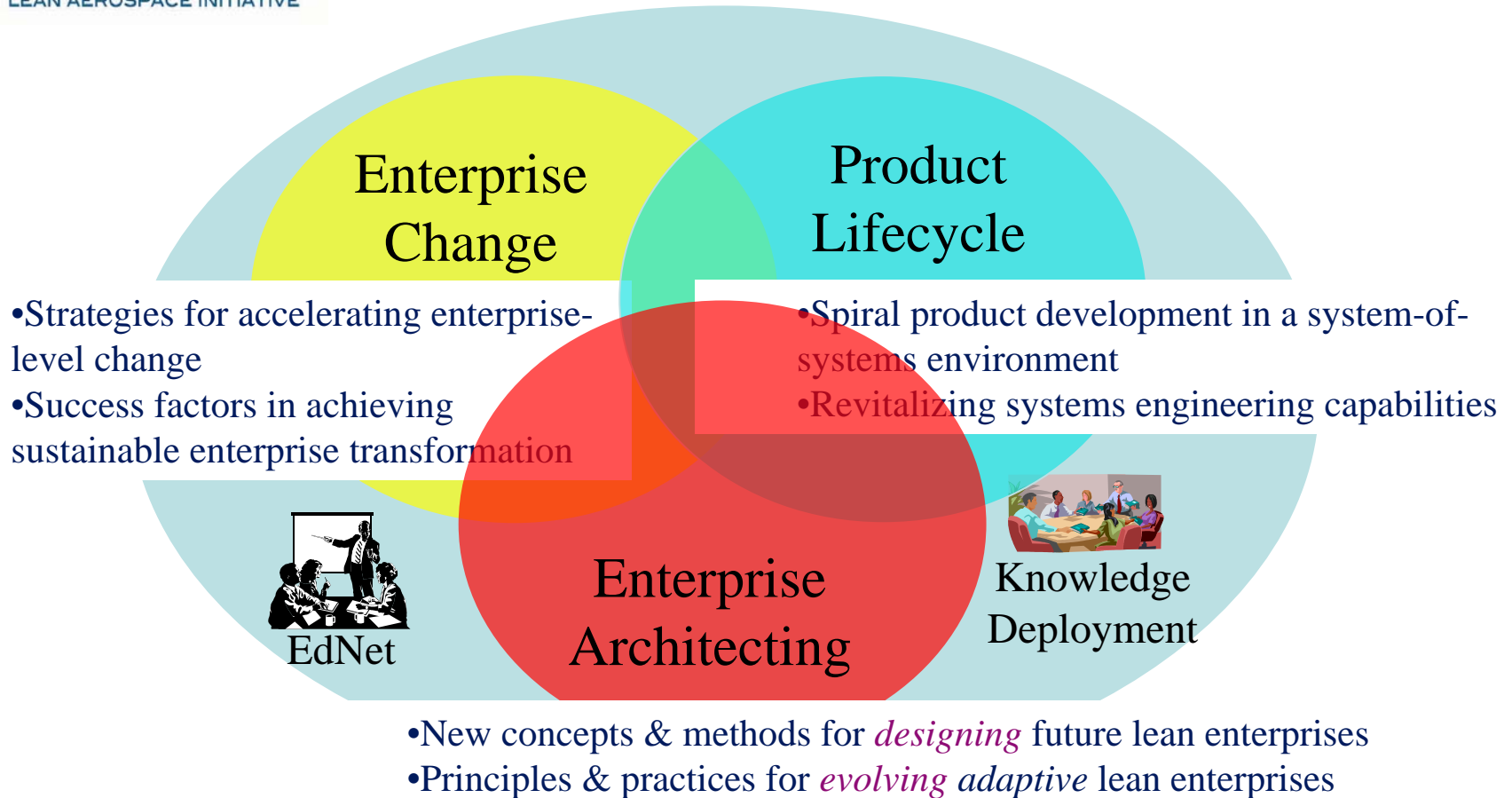


MOVING FROM THE PAST
(vertically integrated) enterprises



TOWARDS THE FUTURE
(networked) enterprises

Three Knowledge Areas Address Key Enterprise Challenges



Enterprise Change KNOWLEDGE AREA

MOTIVATION

General lack of internal lean change capability

Challenge of translating enterprise level strategic change to the functional level

Need to benchmark enterprise change best practices both within and across enterprises

IMPACT

New knowledge and tools for speeding up enterprise transformation efforts across multiple organizations

Developing a unified knowledge base on enterprise change (theory, practices, tools, success stories, lessons learned)

LAI providing value

ACTIVITIES & ACCOMPLISHMENTS

Defining principles & methods for enterprise change management

Focused case studies -- Enterprise change initiatives at Tinker, Ogden, and Warner Robins ALCs; Raytheon Paveway

Enterprise metrics

FUTURE PLANS

Develop a theory of enterprise change and incorporate into TTL Roadmap

Research enterprise change best practices:

- Case studies
- Action research projects (gov't & ind)
- Systems of Metrics
- Cross-organizational learning



Product Lifecycle Area Addresses Key On-going Challenges

- **Applying lean principles to Product Development and Systems Engineering**
- **Developing lean engineering and product/system development capabilities**
- **Enabling increased responsiveness, robustness and integration at enterprise level**
- **Designing and developing complex systems in a system-of-systems environment**

Product Lifecycle Knowledge Area

MOTIVATION

To reduce the cost and cycle time associated with product lifecycle processes while enabling increased responsiveness, robustness, and integration at all enterprise levels

IMPACT

Deploying Lean PD/SE knowledge through training, guidebooks, workshops, conferences
Hundreds trained in Lean Engineering
PDVSM manual used in VSM training/events
LAI papers/panels at several conferences
LAI members engaged in initiatives and deployment of practices

LAI providing value

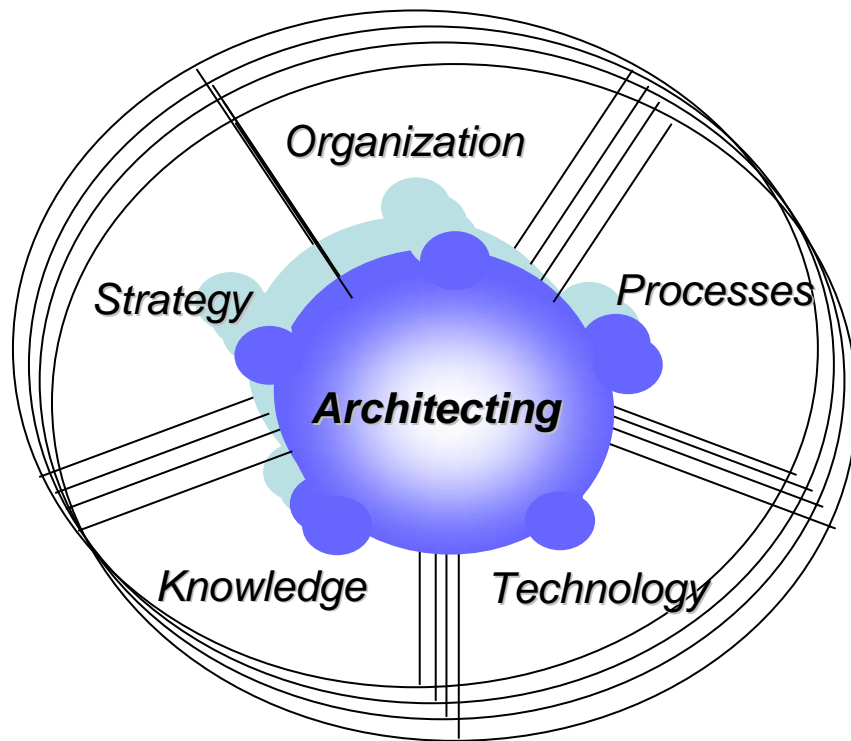
ACTIVITIES & ACCOMPLISHMENTS

PDVSM beta manual and training
MATECON method and training
SE for Robustness workshop with 6 follow-on initiatives
8 graduate theses in product lifecycle area, 6 more forthcoming
SE Research group formed

FUTURE PLANS

Complete and disseminate PDTTL as part of lean PD toolset
Tool for Self-Assessment of Goodness of SE on a Program
Continued research, transformed to practice and methods

Enterprise Architecting Enables Greater Effectiveness



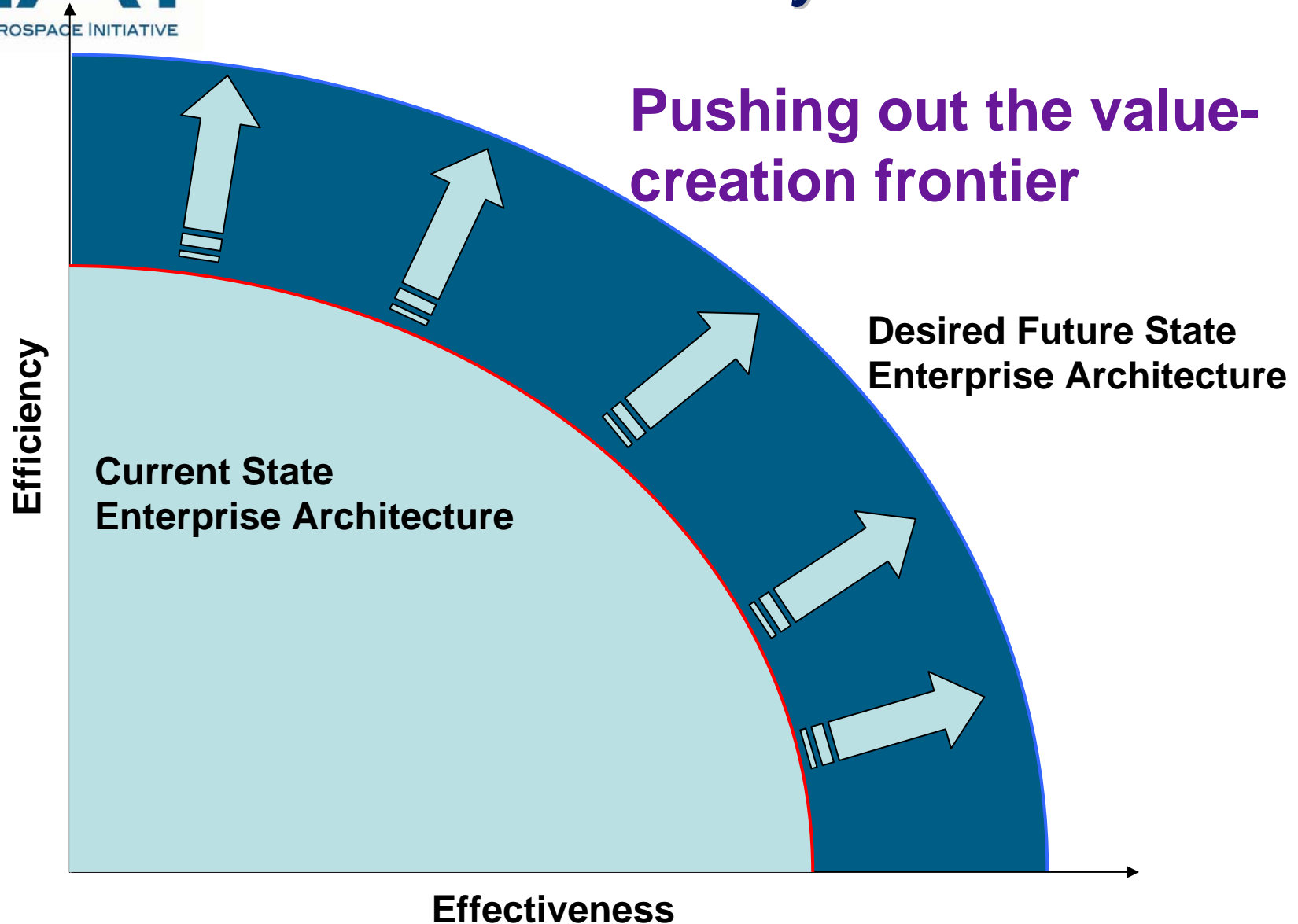
- Effective integration – managing complex interdependencies
- System Optimization, not local optimization
- Knowledge-based enterprise capabilities
- Achieving desired future state characteristics
 - **Agility**
 - **Flexibility**
 - **Reconfigurability**

Networked Lean Enterprises



Delivering Effects-based On-demand Value

Enterprise Architecting – Achieving Greater Efficiency & Effectiveness



Enterprise Architecting -- Pursuing an Integrated Research Agenda

New ***Business Models***
& *Value-Creation*
Frameworks

Designing
Future
Lean Enterprises

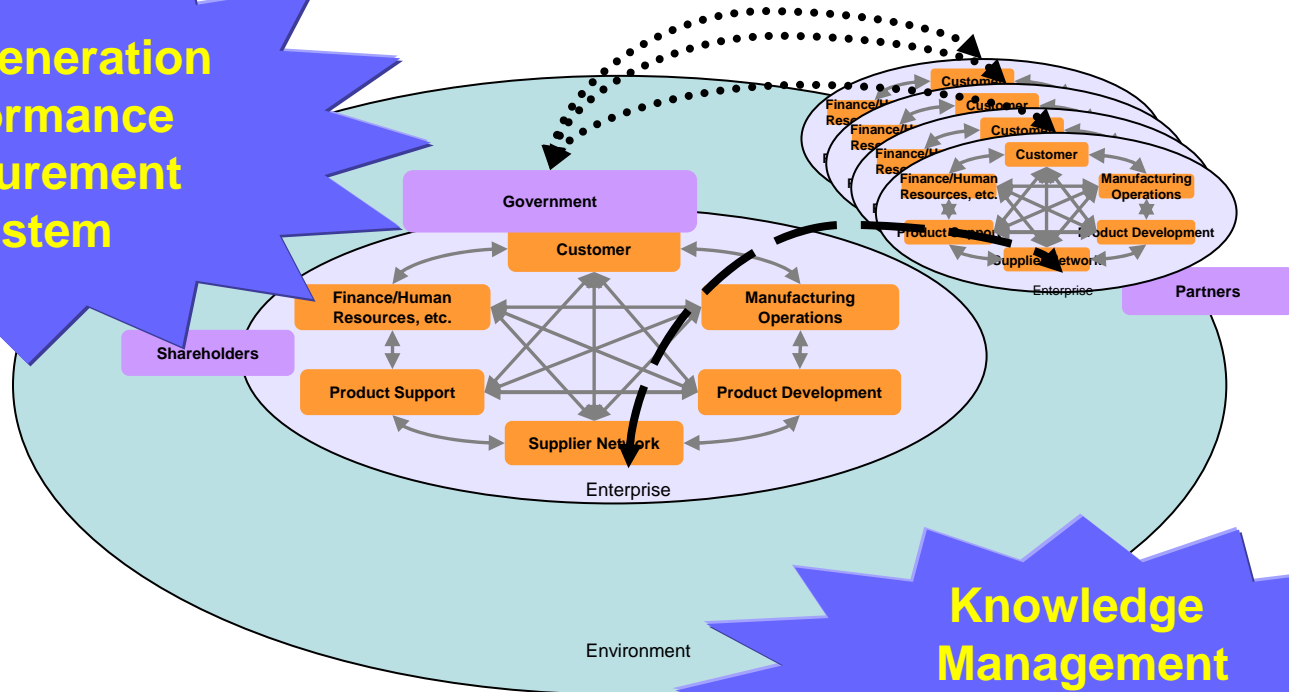
Evolving
Adaptive
Lean Enterprises

- How do we construct robust **value propositions**?
- What are the emerging **new business models**?
- What are the key characteristics of **emerging networked enterprises**?
- How can **knowledge** be transformed for competitive advantage?
- How do you create both **efficient and effective** lean enterprises?
- How do you **organize** to deliver best value to stakeholders?
- How do you build **virtual lean enterprise networks**?
- What **measures & incentives** drive high-performing enterprises?

Emerging Products from Enterprise Architecting Research

Enterprise metrics

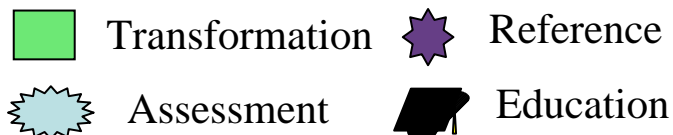
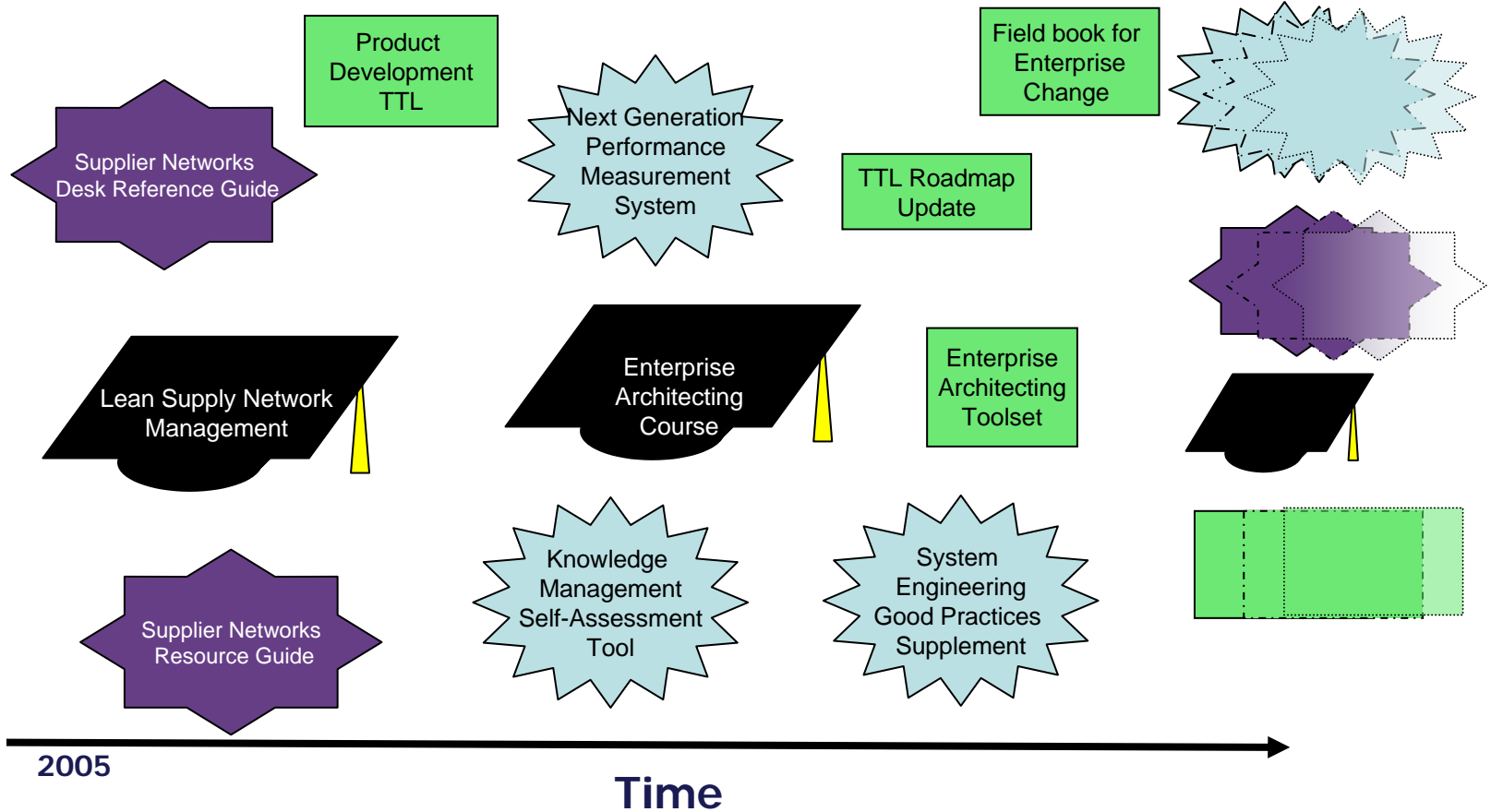
**Next Generation
Performance
Measurement
System**



**Knowledge
Management
Self-Assessment
Tool**

Knowledge Management for Dynamic Enterprise Capabilities

Emerging Products for the Next Phase



- **Highlights Since Last Plenary**
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Enterprise Transformation TTL Roadmap

Entry/Re-entry Cycle

Long Term Cycle

Adopt Lean Paradigm

- Build Vision
- Convey Urgency
- Foster Lean Learning
- Make the Commitment
- Obtain Senior Mgt. Buy-in

Decision to Pursue Enterprise Transformation

Enterprise Strategic Planning

- Create the Business Case for Lean
- Focus on Customer Value
- Include Lean in Strategic Planning
- Leverage the Extended Enterprise

Initial Lean Vision

Focus on the Value Stream

- Map Value Stream
- Internalize Vision
- Set Goals & Metrics
- Identify & Involve Key Stakeholders

Detailed Lean Vision

Develop Lean Structure & Behavior

- Organize for Lean Implementation
- Identify & Empower Change Agents
- Align Incentives
- Adapt Structure & Systems



Short Term Cycle

Environmental Corrective Action Indicators

Focus on Continuous Improvement

- Monitor Lean Progress
- Nurture the Process
- Refine the Plan
- Capture & Adopt New Knowledge

Detailed Corrective Action Indicators

Lean Transformation Framework

Create & Refine Transformation Plan

- Identify & Prioritize Activities
- Commit Resources
- Provide Education & Training



Outcomes on Enterprise Metrics

Implement Lean Initiatives

- Develop Detailed Plans
- Implement Lean Activities

Enterprise Level Transformation Plan

Plenary Focuses on Key Elements of Transition-To-Lean Roadmap

Entry/Re-entry Cycle

Long Term Cycle

Adopt Lean Paradigm

- Build Vision
- Convey Urgency
- Establish a Lean Culture

Focus on the Value Stream

- Map Value Stream

Develop Lean Structure & Behavior

- Organize for Lean Implementation
- Identify & Empower Change Agents
- Align Incentives
- Adapt Structure & Systems

Need to build internal lean infrastructure capability

Decision to Pursue Enterprise Transformation

Enterprise Strategic Planning

- Create the Business Case for Lean
- Focus on Customer Value
- Include Lean in Strategic Planning
- Leverage the Extended Enterprise

Corrective Action Indicators

Focus on Continuous Improvement

- Monitor

Outcomes on Enterprise Metrics

Short Term Cycle

Detailed Corrective Action

Lean Transformation Framework

Create & Refine Transformation Plan

Challenges in translating enterprise level strategic change to the functional level

- Develop Detailed Plans
- Implement Lean Activities

Enterprise Level Transformation Plan

Lean Transformation: Building the Infrastructure

Plenary Highlights

- **Bob Conner**
 - AFMC
 - “Its tough to transform without changing”
 - Oklahoma City ALC
 - “Visioning is hard work”
- **Industry Panel on “Organizational Design Choices in Lean Transformation”**
 - Dr. George Roth (Facilitator), Dr. Bill Kessler, John Kirkgasser, Rusty Patterson, and Charles Touns
 - Senior managers from 4 LAI companies highlighted their companies’ infrastructure for lean and other continuous improvement initiatives.

Plenary Preview – Strategic and Topical Breakouts

- **Wednesday – Strategic Breakout Day**
 - Performance Measurement Frontiers
 - Change Methodology, Planning & Standardization I & II
 - Identifying, Training & Empowering Change Agents
 - Aligning Across Functions
 - Designing Support Structures & Processes
 - Engaging People in Evolving Lean Culture
- **Thursday Morning – Topical Breakouts**
 - Sustaining Lean Change
 - Supply Chain Management
 - Lean Culture & Enterprise Capabilities
 - Product Development

Don't Forget to Check Out the Posters

Plenary Preview – Thursday Afternoon General Session

- **Dr. Jan Klein**
 - “Making Lean Stick” - Three things that must exist for a successful transformation
 - Pull -vs- Push
 - Outsider insiders
 - The infrastructure to make it work
- **Prof. John Carroll**
 - Plenary wrap-up and lessons learned

This Is Your Plenary

- **Learn Something New**
- **Network**
- **Collaborate**
- **Have Fun**

